TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
INSTITUTIONAL BASED PROGRAMME
UNIVERSITY EXAMINATION FOR:
- DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2206: SOIL MECHANICS II
END OF SEMESTER EXAMINATION
SERIES: JULY 2017
TIME: 2 HOURS
DATE: SEPT. 2017

<u>**Instructions to Candidates**</u>

You should have the following for this examination
 -*Answer Booklet, examination pass and student ID*
 -*Drawing instruments.*
 -*Scientific calculator*

This paper consists of **FIVE** questions.
Attempt **any THREE questions**.
Do not write on the question paper
Mobile Phones are NOT allowed inside the examination room

QUESTION ONE

(a) Outline the undrained conditions of test THAT IS applied in triaxial tests. **(8marks)**

(b) With the aid of a sketch explain pure shear mode of failure for triaxial test samples.

(6marks)

(c) (i) Sketch typical graphical results expected from consolidated-undrained

triaxial test.

(ii) Explain the sketch provided in (c) (i). **(6 marks)**

QUESTION TWO

(a) State **FOUR** main advantages for a direct shear strength test. **(6 marks)**

(b) The following results were obtained from drained shear strength tests done on a silty clay soil using a shear box.

Normal stress (KN/m^2)	150	250	350	450
Shear stress at failure (KN/m^2)	89	125	160	195

Determine the shear strength parameters for the soil tested

(c) Another specimen similar to the soil in 4.0 (a) is to be tested using triaxial apparatus under drained conditions, at a cell pressure of $250KN/m^2$.

(i) Determine deviator stress that is anticipated to act at failure,

(ii) Calculate normal stress and shear stress that would develop on plane of failure.

(14 marks)

QUESTION THREE

(a) Briefly describe the general mode of failure applied to footings. **(8marks)**

(b) A circular footing is to be constructed to a depth of 2.0m in stiff clay of saturated unit weight 21.55 KM/m^3. The undrained shear strength of the soil and factor of safety are 120 KN/m^2 and 3 respectively. Using Terzaghi's theory, calculate size of the footing if safe load of 367 KN/m^2 is to be supported. Take $N_c = 8.3$.

(12 marks)

QUESTION FOUR

(a) Outline procedure for standard penetration test **(8 Marks)**

(b) The results of triaxial shear strength tests done on soil samples obtained from a building construction site were as follows:

Test number	1	2	3
Cell pressure (KN/m^2)	150	300	500
Deviator stress at failure(KN/m^2)	190	380	625
Pore pressure at failure (KN/m^2)	69	141	241

Determine the shear strength parameters with respect to the following effective stresses.

(12 marks)

QUESTION FIVE

(a) (i) Explain the term 'shallow footing' applied to Terzaghi's theory on shallow foundations.

   (ii) Explain each term that form Terzaghi's theory for bearing capacity.   **(10 marks)**

(b) A circular footing is to be constructed to a depth of 2.0m in stiff clay of saturated unit weight 21.55 KM/m^3. The undrained shear strength of the soil and factor of safety are 120 KN/m^2 and 3 respectively. Using Terzaghi's theory, calculate size of the footing if safe load of 365 KN/m^2 is to be supported. Take N_c = 8.3.

(10 marks)